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**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Application Number: 10/624,038

Filing Date: July 21, 2003

Appellant(s): CHEN ET AL.

John F. McCabe
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed November 15, 2007 appealing from the Office action mailed May 23, 2007.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

No amendment after final has been filed.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

5,506,427	IMAI	4-1996
5,444,003	WANG	8-1995
6,541,346	MALIK	4-2003
5096844	KONIG ET AL.	3-1992

Definition of "sub" (definition 2b), Merriam-Webster's Collegiate Dictionary, Tenth Edition, 1993.

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 8, 10, 12-14, 16, 22 and 25 are rejected under 35 USC § 102(b) as being anticipated by Imai (US 5,506,427).

Regarding claim 8, Imai illustrates in figures 1(A)-4 (entire document), particularly figure 1(H), an integrated circuit comprising:

a substrate 10/12/18 having a top surface;

collector 14, base 30a/32/36, and emitter 38/40 semiconductor layers of a bipolar transistor, the semiconductor layers forming a vertical sequence on the substrate in which intrinsic portions of two of the semiconductor layers (14 and 36) are sandwiched between the top surface of the substrate 10 and a remaining top one 38/40 of the semiconductor layers,

the base layer comprising an extrinsic portion 30a/32 that laterally encircles a vertical portion of the top one of said semiconductor layers 38; and

a dielectric sidewall 34 being interposed between the vertical portion of the top one 38 of the layers and the extrinsic portion of the base layer 32; and

wherein the substrate 10/12 includes a subcollector 18 that forms an electrical contact for the collector layer 14, the entire subcollector being located outside of the portion of the substrate that is vertically below part of the base layer.

Regarding claims 10 and 14, Imai illustrates in fig. 1(H) that the extension of the base layer 32 extends farther away from the substrate 10 than an interface between the top layer 38 and the base layer 36.

Regarding claim 12, Imai illustrates in fig. 1(H) the part of the extension of the base layer 32 is located between the substrate 10 and an extrinsic portion 40 of the top one of the semiconductor layers.

Regarding claims 13 and 25, Imai illustrates in fig. 1(H) comprising a dielectric layer 26 (labeled in figure 1B), a portion of the dielectric layer being located on the extrinsic portion of the base layer 30a/32 and the extrinsic portion 40 of the top one 40 of the semiconductor layers being located on the dielectric layer.

With regards to claim 16, Imai discloses in col. 4, lines 14-16, the top one 38 of the collector, base, and emitter semiconductor layers is epitaxially grown.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill

in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 17 is rejected under 35 USC § 103 (a) as being unpatentable over Imai as applied to claim 8 above, and further in view of U.S. Patent No. 5,444,003 to Wang et al. ("Wang").

With regard to claim 17, Imai is discussed above, it does not show the top one of the semiconductor layers, the emitter, is a graded layer. Wang illustrates in figures 3A and 3B and discloses in col. 7, lines 36-62, the top one of the semiconductor layers, the emitter 22, is a graded layer. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have a graded emitter layer for a "top-down" process that is highly compatible (Wang col. 3, lines 24-32).

Claims 18, 19, 29 and 30 are rejected under 35 USC § 103 (a) as being unpatentable over Imai as applied to claim 8 above, and further in view of Malik (US 6,541,346 B2).

Imai is discussed above, it does not show the top one of the semiconductor layers, the emitter, includes gallium or an InP layer or that the base layer comprises gallium or gallium, indium and arsenic. Malik discloses in col. 2, lines 23-31, that typical materials for HBT's include forming the emitter (top one of the semiconductor layers) of AlGaAs or InP and forming the base of InGaAs. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have a top AlGaAs or InP emitter layer and a base of InGaAs to reduce the injection of majority carriers from base to emitter to allow improvements in the high-frequency performance of the transistor (Malik col. 2, lines 31-43).

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various

claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claim 31 is rejected under 35 U.S.C. 103(a) as being unpatentable over Imai with Malik as applied to claims 18, 19, 29 and 30 above, and further in view of Konig et al. (US 5,096,844).

Imai with Malik do not teach the substrate being an InP substrate. Malik teach the advantageous use of an InP/InGaAs HBT where the emitter is InP and the base is InGaAs. However, Malik does not explicitly disclose what materials the collector and substrate are in the InP/InGaAs HBT. Nonetheless, forming the collector of InP in an InP/InGaAs HBT would be implicitly understood by one of ordinary skill in the art at the time of the invention. Konig et al. teach on column 4 lines 25-28 that it was known at the time of the invention to form the collector of InP when forming a InP/InGaAs HBT. Thus, Konig et al. provides evidence that one of ordinary skill in the art would recognize that the InP/InGaAs HBT of Malik is known to include an InP collector. Konig et al. further teach that when forming a HBT using an InP collector, the substrate should be InP. The motivation for choosing InP as the substrate is to provide lattice matching with the collector layer (Konig et al. column 2 lines 40-43). Thus, at the time of the invention it would have been obvious to one of ordinary skill in the art to employ an InP substrate as taught by Konig et al. into the device of Imai and Malik.

(10) Response to Argument

Regarding claims 8, 10, 12-14, 16, 22, and 25 as being anticipated by Imai

In the Final Rejection, the Examiner refers to element 18 (as shown in Figure 1H of Imai) as the claimed “subcollector”. Appellant’s arguments are based on the premise that element 18 cannot be considered a subcollector. The Examiner respectfully disagrees with this position.

Appellant argues regarding the rejection of claim 8 over Imai that:

“Figure 1H clearly shows N+-type layer 18 as being located to the side of the layer 14 and clearly identifies layer 14 as the collector. That is, the parts of Imai relied on by the Final Office Action do not show the N+-type layer 18 as being below the collector 14.”

However, claim 8 does not require the subcollector to be “below” the collector. The word “below” is absent from claim 8. Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). “Though understanding the claim language may be aided by explanations contained in the written description, it is important not to import into a claim limitations that are not part of the claim. For example, a particular embodiment appearing in the written description may not be read into a claim when the claim language is broader than the embodiment.” *Superguide Corp. v. DirecTV Enterprises, Inc.*, 358 F.3d 870, 875, 69 USPQ2d 1865, 1868 (Fed. Cir. 2004). The instant specification does not provide an explicit definition of the term “subcollector” that would preclude the interpretation set forth by the Examiner.

Appellant further argues that:

“In particular, subcollector includes the prefix “sub” and the noun “collector”. Since the prefix “sub” means “below”, it is evident that the term subcollector must refer to a feature or layer that is located below the

collector. Thus, Imai's N+ -type layer 18 cannot be a subcollector, because the N+ -type layer 18 is simply not located below Imai's collector 14."

While the Examiner agrees that "below" is one possible meaning of the prefix "sub", it is not the only meaning. During patent examination, the pending claims must be "given their broadest reasonable interpretation consistent with the specification." *Phillips v. AWH Corp.*, 415 F.3d 1303, 75 USPQ2d 1321 (Fed. Cir. 2005). MPEP §2111 states:

Applicant always has the opportunity to amend the claims during prosecution, and broad interpretation by the examiner reduces the possibility that the claim, once issued, will be interpreted more broadly than is justified. *In re Prater*, 415 F.2d 1393, 1404-05, 162 USPQ 541, 550-51 (CCPA 1969). See also *In re Morris*, 127 F.3d 1048, 1054-55, 44 USPQ2d 1023, 1027-28 (Fed. Cir. 1997) (The court held that the PTO is not required, in the course of prosecution, to interpret claims in applications in the same manner as a court would interpret claims in an infringement suit. Rather, the "PTO applies to verbiage of the proposed claims the broadest reasonable meaning of the words in their ordinary usage as they would be understood by one of ordinary skill in the art, taking into account whatever enlightenment by way of definitions or otherwise that may be afforded by the written description contained in applicant's specification.").

Terms such as "subset" and "subcombination" illustrate that the prefix "sub" has alternate meanings which have nothing to do with relative, physical locations. For instance, Merriam-Webster's Collegiate Dictionary (10th edition) defines the term "sub" as "a subordinate portion of: subdivision of". Clearly a subcombination does not need to be below a combination. This is also true when referring to a "subcollector". A subcollector is merely a subordinate portion of, or a subdivision of the collector. The physical location of the subcollector relative to the collector is irrelevant. In the specific example shown in Figure 1H of Imai, elements 12 and 18 are heavily doped regions that form the conductive path from collector region 14 to the collector contact (not shown). Therefore, region 18 can be considered a "subdivision" of the collector,

which in turn means region 18 can be considered a subcollector. The broad interpretation set forth by the Examiner is consistent with the specification since the term "subcollector" was not explicitly defined as being "below" the collector. Although claims of issued patents are interpreted in light of the specification, prosecution history, prior art and other claims, this is not the mode of claim interpretation to be applied during examination. During examination, the claims must be interpreted as broadly as their terms reasonably allow. *In re American Academy of Science Tech Center*, 367 F.3d 1359, 1369, 70 USPQ2d 1827, 1834 (Fed. Cir. 2004). Note that the definition from Merriam-Webster's is merely provided as evidence to rebut the argument, presented by Appellant for the first time in the Appeal Brief, that the prefix "sub" means "below". As such, the citation of Merriam-Webster's definition of "sub" does not constitute a new grounds of rejection (see MPEP 1207.03(III)).

Applicant further argues:

"For completeness, Applicants also mention that Imai's Fig. 1H does show another N+-type layer 12 that may be identified as a "subcollector". The N+-type layer 12 is buried below Imai's collector 14. Thus, the N+-type layer 12 is located where a subcollector must be located. Nevertheless, the N+-type buried layer 12 of Imai does not meet the limitations recited by pending claim 8 for the subcollector."

As indicated in the Final Rejection, region 18 is identified as the claimed subcollector, not region 12. Therefore, whether or not region 12 meets the limitations of claim 8 has no bearing on the validity of the rejection.

Appellant further argues:

"Claims 10, 12-14, 16, 22, and 25 are novel over Imai as applied in the Office Action, at least, by their dependence on novel base claim 8".

As established above, claim 8 is anticipated by the disclosure of Imai. Therefore, claims 10, 12-14, 16, 22, and 25 are not patentable based on their dependence on claim 8. Note that Appellant has not presented any substantive arguments against the rejections of the individual dependent claims.

Regarding Claim 17 as being obvious over Imai in view of Wang

Appellant does not argue the patentability of this claim individually, but rather states: "Claim 17 is non-obvious over the above combination, at least, by its dependence on base claim 8, because the Final Office Action does not apply Wang to teach features of base claim 8."

As established above, claim 8 is anticipated by the disclosure of Imai. Therefore, Appellants arguments regarding the obviousness of claim 17 are not persuasive.

Regarding claim 18, 19, 29, and 30 as being obvious over Imai in view of Malik

Appellant does not argue the patentability of these claims individually, but rather states: "Claims 18-19 and 29-30 are non-obvious over the above combination, at least, by their dependence on pending claim 8, because the Final Office Action does not apply Malik to teach elements of base claim 8."

As established above, claim 8 is anticipated by the disclosure of Imai. Therefore, Appellants arguments regarding the obviousness of claims 18-19 and 29-30 are not persuasive.

Regarding claim 31 as being obvious over Imai in view of Malik, and in further view of Konig

Appellant does not argue the patentability of this claim individually, but rather states:

"Claim 31 is non-obvious over the above combination, at least, by its dependence on pending claim 8, because the Final Office Action does not apply Malik or Konig to teach elements of base claim 8."

As established above, claim 8 is anticipated by the disclosure of Imai. Therefore, Appellants arguments regarding the obviousness of claim 31 are not persuasive.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/Matthew C. Landau/

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